

Social Integration and Cognition among Older Adults

(Preliminary Analysis)

Cynthia J. Peters

Center on Economics and Demography of Aging, NORC

University of Chicago

&

Linda J. Waite

Department of Sociology

University of Chicago

&

Alisa C. Lewin

Department of Sociology and Anthropology

University of Haifa

*** Paper submitted for consideration for presentation at the annual meeting of the
Population Association of America, New York 2007.**

Social Integration and Cognition among Older Adults

Abstract

This study examines the effects of social integration on cognitive performance and on cognitive decline among non-disabled mid-life adults. The effects of four dimensions of social integration on cognition are explored: living with spouse and with other family members, level of contact with neighbors and non-resident family members, social engagement and participation in complex social environments. Data for the study are drawn from the Health and Retirement Study 1992-2000. The independent variables, measured at Time 1, are used to predict cognitive functioning 1992 - 2000. Cognition was measured as score in an immediate recall test. Although the effects were relatively moderate, preliminary results suggest that social engagement and participation in complex social environments (supervising others at work) have long-term effects that may delay cognition decline among older adults, even when controlling for health and demographic characteristics.

Recent research has highlighted evidence of individual differences in the rate of cognitive aging. Several clinical studies as well as population-based studies demonstrate strong, independent associations between leisure activities and risk of dementia, leading to recommendations for the assessment of cognitively stimulating activities. While current research has established that some aspects of lifestyle are related to traditional risk factors such as smoking and physical exercise, the contribution of broader factors is not known. Investigation in this area is based on the premise that cognitive ability is not "fixed," and that controllable factors play a part in maintaining cognition in adulthood.

Until recently, the prevalent model of cognitive aging was one of unavoidable decline leading to inevitable neuronal loss. The contemporary view is radically different. The aging brain is now capable of considerable adaptation as the brain continues to utilize its neuron-protective capacities. Further, social adaptive processes continue thereby creating a context within which individuals are allowed time to adapt their altered cognitive functions through social opportunities. Seen in these terms, attention is increasingly being paid to lifestyle variations that might be beneficial to cognitive function. Lifestyle is seen to represent a number of different constructs—social support, social networks, physical exercise—and there is some support for a positive association with cognitive function for all of them.

Yet, even though cognitive performance is a key determinant of quality of life in older adults, few studies examine cognitive function as a potential outcome influenced by social relationships. The knowledge base on social relationships and health is growing, but it currently raises as many questions as it answers. Several cross-sectional studies showed that cognitive ability is strongly related to social ties and various activities. However, cross-sectional data make causal interpretation of results ambiguous; these studies lack the correct temporal evidence

between cause and effect. Only longitudinal data can establish a causal impact of social relationships on the way in which cognition declines with age, as well as to test fully the explanations in terms of exposure to and impact of other psychosocial factors.

In the present study, we use longitudinal data to examine whether socially integrated lifestyle might protect against dementia. Because we can examine the relationship over time, we can begin to mark and understand a range of processes in order to identify which pathways may be the most amenable to intervention. We address the following questions: (1) What is the impact of social integration on current cognitive status and on cognitive changes at a time when there is diminished participation in activities that promote social integration? (2) To what extent are social relationships net of other pertinent factors predictive of maintaining cognitive performance in later life?

Background and Significance

The suggestion that engagement in challenging spare-time activities can diminish, and perhaps even reverse the rate of decline has major public health implications. Similarly, the identification of risk factors that accelerate cognitive decline and development of key strategies to preserve cognitive health as we grow older are major public health goals. An expert panel appointed by the National Institutes of Health (NIH) to assess current scientific knowledge about brain health finds that heart health, physical activity, freedom from chronic illness and a strong social support system may help maintain mental sharpness and emotional well-being as we age (Hendrie et al., 2006). There are, however, several theoretical and methodological problems in interpreting potential findings in this area.

First, it is unclear which activities are the most important for cognitive maintenance. Significant effects have been reported for intellectual stimulation, social engagement, and

physical exercise (Scarmeas and Stern, 2004). Unfortunately, it is difficult too isolate these different components from each other but such an isolation would be important for formulating possible intervention strategies for minimizing cognitive decline.

Second, it is difficult to determine the direction of causality. While it is possible that activity directly promotes cognitive growth and maintenance, people with high cognitive ability are also likely to engage in such activities. Similarly, decline in cognitive performance might lead to a decline in mobility. This issue of causality is difficult to resolve, even with longitudinal data (Hultsch, Hertzog, Small, Dixon 1999).

Third, some studies do not control for factors that may account for the association between activity and cognition, particularly education, intelligence, and occupational social class (Gold et al., 1995).

Fourth, it is unclear whether there is a sensitive period for activity engagement. Most studies focus on later life, and little is known about the effects of activity on cognition in midlife and earlier.

The Health and Retirement Study (HRS) provides an opportunity to examine effects of different lifestyles on memory performance among a pre-retirement population. Participants perform several tasks related to three measures that constitute cognitive status—memory; working memory; and knowledge, language, and orientation—evaluated in all waves of the HRS data collection. In the current study we investigate the association between social integration and verbal memory, controlling for age, gender, education, race, mental and physical health status

Effect of a Small Quantity and Low Quality of Social Relationships

To assess cognition and social integration, we draw primarily on social integration theory, which underscores the role of social attachments on individual well-being. The concept of social integration is rooted in Durkheim's (1897/1951) seminal work on social conditions and suicide. Durkheim proposed that stable social structure and widely held norms are protective and regulate behavior. Consistent with this reasoning, his analysis of suicide rates indicated that suicide was most prevalent among individuals who were not married and lacked ties with the community and the church.¹

A more explicit theory of how social integration benefits well-being was proposed by Thoits (1983). Thoits argued that people's identities are tied to their social roles. Social roles are viewed as sets of behavioral expectations that emerge from the social environments in which one interacts. These behavioral expectations instill a sense of predictability in people's lives by providing information about how they ought to act. Role identities provide people information about who they are in an existential sense, and social roles provide a purpose to life. By meeting role expectations, individuals are given the opportunity to enhance their self-esteem. Thus, as people successfully accumulate role-identities in different domains, the sense that they possess a meaningful existence strengthens. It is implied that a sense of meaning in life is an integral component of psychological well-being and that failing to have a sense of meaning often leads to improper conduct and deviant self-destructive behavior (Smith, 1997).

Cohen (1988) expressed a position similar to Thoits (1983) in his description of identity and esteem models of the psychological influence of social relationships. . Cohen's theoretical

¹ In contrast to their predecessors, a number of sociologists later suggested that participation in multiple social domains was detrimental to psychological well-being (Goode, 1960; Slater, 1963; Coser, 1974). Although Goode's ideas have some intuitive appeal, the empirical data have provided only limited support (Sieber, 1974, Thoits, 1983).

model suggests that possessing multiple social roles promotes self-esteem and self-worth. Feelings of esteem and self-worth are thought to enhance adaptation to stressful life events, promote positive affect, and prevent depression. The cognitive benefits afforded by holding multiple social roles lessen psychological despair, generate positive affect, and facilitate health-promoting behaviors.

Differences in Broader Social Ties and Satisfaction with Social Relationships

As noted earlier, social integration often refers to specific interpersonal ties, such as the number of members in a person's social network or the number of social roles held by an individual (Pillemer, Moen, Wethington, Glasgow, 2000). Integration can also refer to social embeddedness, indicated by broader social ties such as marriage and contact with family or close relatives. These ties are important to consider in cognitive aging because: (a) they enhance access to coping resources; (b) they provide a context within which supportive relationships can develop outside the family; and (c) a lack of social integration robs life of meaning, thereby generating stress and depression (George, 1996). In the presence of social support, older adults feel loved, are better able to deal with health problems and have high self-esteem (Silverstein & Bengtson, 1994).

Our main objective is to investigate the contribution of psychosocial factors of social integration in a longitudinal, population-based sample of middle-aged and older adults. While prior epidemiological research on cognitive aging has focused primarily on traditional risk factors, we set out to examine the relative contributions of a broader range of lifestyle variables. We find that social network is an important predictor of cognitive performance, along with a number of demographic and health behaviors. We use regression models to address the following four research questions:

Question 1. Are close social ties associated with maintenance of cognitive ability, net of health and demographic characteristics? Close social ties are measured as having family members in the household. We include two measures of close social ties in the household, spouse and number of parents and children living in the household.

Question 2: Is social contact with neighbors and family members living outside the household associated with lower risk of cognitive decline, net of health and demographic characteristics? We have two measures of social contact with family living outside the home: frequency of contact with parents and frequency of contact with children living outside the home.

Question 3. Is social engagement associated with maintenance of cognitive ability, net of health and demographic characteristics? We have two measures of social engagement, employment (not supervising) and volunteering.

Question 4: Is participation in complex social environments associated with maintenance of cognitive ability, net of health and demographic characteristics? Participation in complex social environments is measured as supervising other people at work.

Data and Methods

Data for this study came from the Health and Retirement Study (HRS), a longitudinal survey of older Americans. It began in 1992-1993 as two separate samples: the original HRS sample focused on the 1931-1941 birth cohorts and the Assets and Health Dynamics among the Oldest Old (AHEAD) focused on the 1890-1923 birth cohorts. In 1998, the two samples (wave 4 of HRS and wave 3 of AHEAD) were merged, and two new cohorts—Children of the Depression Age (1924—1930 cohorts) and War Babies (1942—1947 cohorts)—were added. The combined sample of 21,384 respondents is representative of all American born between 1890 and 1947 and their spouses. The HRS sample was derived from a stratified, multistage area probability design

in which blacks, Hispanics, and Floridians were over sampled. Baseline interviews were completed in 1992. Our analytic sample is restricted to the 9,540 age-eligible white, black, and Hispanic respondents interviewed at wave 1. Of these, we include respondents who were alive and interviewed at wave 2. We then exclude the small minority of respondents for which information on family structure was not available at wave 1; then we exclude proxy interviews. Our sample thus consists of 9,184 white, black, and Hispanics age 51 to 61 at baseline, in 1992 (some age-eligible respondents had turned 62 by the interview).

Table 1 presents means and standard deviations for the independent variables considered in this analysis. Measures are coded so that higher values indicate better functioning. In this study we examine four different dimensions of social integration: living with family members in the household, contact with neighbors and family members living outside the home, social engagement and participation in complex social environments.

- Table 1 about here -

Living with family members: We distinguish spouse from other family members in the household.

Level of contact with family members residing outside the household: The HRS data do not include a measure of quality of contact with family members living in the household, but they do include measures of frequency of contact with family members living outside the household. Therefore, we include a variable indicating the number of parents (and parents in-law) and children living outside the household. The data allow us to distinguish between level of contact with parents and level of contact with children living outside the household, and we include these two measures in our analyses. We also include a variable that indicates that the respondent knows neighbors' names, as a proxy of quality of social contact with neighbors.

Social engagement is measured as being employed (but not supervising others) and as volunteering. Both measures indicate some level of social participation and engagement in social activity.

Participation in complex social environment is measured as having a supervisory position at work. The underlying assumption here is that supervising others at work requires more sophisticated social and communication skills than just being employed or volunteering.

Health and physical wellbeing: We include two measures of health and physical wellbeing, the number of chronic health conditions and mobility limitations. The number of chronic health conditions was measured as the sum of the following conditions: diabetes, heart disease, lung disease, cancer, hypertension stroke and depression. This variable represents the number of chronic conditions; and ranges from 0 to 7. Respondents were coded as having some level of depression if they responded they felt depressed on any of 11 items. We use a Mobility Index that directly assesses the respondent's capacity for physical mobility and thus is a measure of physical functioning. Respondents indicate whether or not they have difficulty with five forms of ambulation, such as walking a block, climbing a flight of stairs; scoring from 0—4, where 1= very difficult to 4 = not at all difficult. We calculated an alpha coefficient for the Mobility Index of .78, suggesting the scale is internally consistent.

In our analyses we control for basic demographic characteristics: age, gender, education, and race. We coded age as a continuous covariate. Gender was coded with female as 1. Education is measured in years. Race is set of dummy variables distinguishing between Blacks, Hispanics and Whites (is the reference category in regressions).

Dependent Variable: Cognitive Performance

The HRS collected data from a series of tests based on a modified version of the Telephone Interview for Cognitive Status. There were four memory and two executive functioning tasks asked. In our study we chose to focus on one such task, the immediate recall test, which required recalling as many words as possible from a list of commonly used words immediately after the interviewer read the list. We chose to focus on immediate recall because prominence is assigned to memory in classification criteria for mild cognitive impairment and dementia, and because poor memory, unlike knowledge or skills, is a predictor of clinically significant cognitive decline (Jackson, 2000; Ritchie and Touchon, 2000). This test assesses ability to acquire new information and is scored as the correct number of words recalled from a list read by the interviewer. Mean scores are about 7 recalled words out of 20 (1992, 1994); and the mean is around 7 when 10 words were asked (1996, 1998, 2000).

Data Analysis

In this study, all of the independent variables are measured at Time 1. A regressor variable approach (residualized regression) is used to predict changes in cognition between 1992 and subsequent years, through 2000. Therefore, these models estimate 1994 - 2000 cognition as a function of the 1992 cognitive scores, the independent variable, and the controls.

The preliminary set of analysis entailed ordinary least squares regression models to test the cross-sectional relationship between social integration and cognition in 1992. The longitudinal analyses tested whether social relationships in 1992 were associated with change in cognitive performance from 1992 to 2000.

Preliminary Results

Tables 2 presents regression coefficients predicting cognition in 1992, 1994, 1996, 1998 and 2000. The results for 1992 are cross-sectional. The analyses for subsequent years measure

change in cognition by using residualized change scores of cognitive performance. Moreover, these analyses measure long-term effects on change in cognition. The preliminary results suggest that employment, volunteering and supervising others all delay cognitive decline, net of health and demographic characteristics. The effects are statistically significant at baseline (1992) and they remain statistically significant in the longitudinal analyses. These results have important implications on long-term effects of social engagement and participation in complex social environments on delayed decline in cognition among older adults.

- Table 2 about here -

Our results do not reveal any effects of social ties or social contact on cognition. It is possible that our measures of social ties and social contact are not sensitive to differences in this relatively young cohort. Alternatively, it is possible that social ties and social contacts, as measured in our study, become important for cognition later in life.

Future studies will further explore the relationship between social integration and cognition, by class and gender.

Discussion

Our results suggest that social engagement and participation in complex social activities may have long term effects delaying the decline of cognition among older adults. These long term effects are statistically significant, even when controlling for chronic health conditions, mobility limitations and demographic characteristics. Similar to the effect we would expect from education, social engagement and participation in complex social environments appear to have long term effects that may augment brain reserve capacity, which offers protection from cognitive decline in old age.

It is likely that people with higher cognitive skills are selected into employment, volunteering and supervisory positions relative to people with lower cognitive abilities, and this may explain the cross-sectional relationship between social engagement and cognition. But, in our longitudinal analyses we control for cognition in 1992, and we measure *change* in cognition. Although even with longitudinal data we acknowledge that we cannot determine causality, our findings are consistent with the argument that social engagement is associated with a delay in cognitive decline. Moreover, we find that social integration may have long-term effects on cognition.

Experimental studies in animals show that environmentally enriched conditions have the potential to reduce cognitive deficits in young and even in adult rats; and that the negative effects of impoverished environments on memory are partly reversible. The research linking high occupational attainment and cognition in adult life suggests that the stimulation provided by work helps to maintain cognitive function.

We find that engagement in employment, volunteering and supervising others protects against cognitive decline. This interpretation of our results is supported by research on stress. For example, reducing levels of stress hormones and blood pressure are known to influence cognition. Therefore, psychological mechanisms, such as relaxation and stress reduction through social integration and support might be common mechanisms to protect against cognitive decline. According to House (1988), support refers to the positive potentially health promoting aspects of relationships such as instrumental aid, emotional caring or concern, and information. Supportive relationships directly provide something that people need to stay healthy or to adapt to stress. It is often assumed or implied that people with more relationships or more frequent interactions are healthier (physically) and live longer because of these relationships. The

research linking social exposure and integration with cognitive function suggests that the opportunities to engage with others leads to positive emotional states such as self-esteem and competence, which lead to lower stress. Over time, social integration acts as a buffer against the effects of negative stressors and mitigates the demands of stress on cognitive resources (Seeman, Berkman, Blazer, and Rowe, 1994; Uchino, et al., 1999). Perhaps social integration, given its overwhelming, positive effects on physical health, will have the same influence on cognitive health.

References

Zerger, Liang, and Albert, 1988

Crowe, 2003

Kivipelto, 2001

Lindenberger, Singer, and Baltes, 2002

Van Hooren, Valentijn, Bosma, Ponds, vanBoxtel, and Jolles, 2005

1993 Education and the prevalence of dementia *Neurology*, 3: 13-20

Lee, Kawachi, Berkman, and Grodstein, 2003

1995. *BMJ* 10: 951-2.

1999. *Annals of Internal Medicine*, 131, 165-173.

1996. *Age and Ageing*, 25, 72-80.

Stevens, FCJ 1999. How ageing *Age Ageing*, 28, 379-84.

1995. *Psychology and Aging*, 10, 294-303.

2003. Cognitive reserve and lifestyle. *J Clin Exp Neuropsychol* 25: 625-33.

Cognitive reserve: Implications for diagnosis and prevention of AD *Curr Neurol*

Neurosci Rep 2004: 4 (5): 374-80

Wilson, R.S. Evans, D. A. Bienias, J. L. 2003 *Neurology* 61: 1479-85.

Elwood 1999. *J Epidemiol Community Health*, 53, 9-14.

1999, *BMJ* 319: 478-483.

2005. *J of Geron B Psychol Sci Soc Sci*, 60B, P113-P120.

1986. *Developmental psychology*, 22, 223-232.

(1999), *Annals of Internal Medicine*, 131, 165-173.

2003. *Psychological Science*, 14: 125-130. (Fitness effects on the

1999 Use it or lose it. *Psychology and Aging*, 14, 245-263.

(1992) *Psychology and Aging*, 7, 25-36.

Cognitive reserve: Implications for diagnosis and prevention of
Alzheimer's disease *Curr Neurol Neurosci Reports* 2004: 4(5) : 374-80.

Hultsch, 1999. *Psychology and Aging*, 14, 245-263.

(1995). Gold, Andres, Etezadi, Arbunckle, Schwartzman, and Chaikelson.
Psychology and Aging, 10, 294-303.

2000. Pillemer, Moen, Wethington, and Glasgow. (2000). *Social
integration in the second half of life*. Baltimore: Johns Hopkins University
Press.

1994. *Social Science and Medicine*, 38: 943-957.

1995. Berkman, L. F. The role of social relations in health promotion.
Psychosom Med 57: 245-54..

House 1988

Uchino, B.N., Holt-Lunstad, J., Uno, D., Betancourt, R., and Garvey, T.S.
(1999). Social support.....*Annals of Behavioral Medicine*, 21, 135-142.

House, JS. Landis KR., Umberson, D. *Social relationships and health*,
1988. *Science* 241: 540-45.

1996 George. *Handbook of Aging*, 4th

2001. *Am N Y Acad Sci*, 954, 88-117.

1998. *Age Ageing* 27: 477-83.

2000. Fratiglioni, Wan, Ericsson. *Lancet*, 355: 1315-1319.

Unger, 1999. *Journal of Geron*

2005. *Journal of Gerontology*, 60B: P320-P330.

2002 Wang, Karp, Winblad, and Fratiglioni,

2003. *Journal of Gerontology: Social Sciences*, 58B: S338-S346.

1994. *Diagnostic and statistical manual of mental disorders (4th ed.)*.

1995. Washington, DC: American Psychiatric Association.

Ritchie, K. (2000). *Lancet*, 355, 225-228.

2004. Social Network Characteristics and Cognition in Middle-Aged and Older Adults.

Journal of Gerontology: Psychological Sciences 59B: P278-P284.+

1995. *The Journal of Human Resources*, 30, Supplement: S84–S107.

2002. *J Geron B Psychol Sci Soc Sci* 57, 153-62.

2002. *J Aging Health*, 14, 211-36.

1996. *Ann Epidemiol* 6, 442-451.

1994. *Annals of Behavioral Medicine*, 16, 95-106.

Hendrie, Albert, Butters, Gao, Knopman, Launer, et al., 2006

Salthouse, Berish, and Miles, 2002

Table 1. Description of Measures and Sample (n= 9184)

<i>Characteristic</i>	<i>Mean (Standard Deviation) or Percent</i>
Cognitive function	
Immediate WR 1992 (0–20) ^a	7.44 (2.64)
Immediate WR 1994 (0–20) ^a	
Immediate WR 1996 (0–10) ^a	
Immediate WR 1998 (0–10) ^a	
Immediate WR 2000 (0–10) ^a	
Domain: Social ties	
Presence of spouse or partner	75.36
No of family members in household	.706 (.999)
Family members outside household ^b	3.07 (2.31)
Domain: Social contacts	
Level of contact with parents ^c	2.27 (1.95)
Level of contact with kids	1.08 (1.38)
Knows neighbors' names ^d	.60 (.490)
Domain: Social engagement	
Volunteering ^e	19.04
Working, not supervising others	58.23
Domain: Complex social environment	
Supervise others at work	9.26
Health status 92	
Chronic conditions (0–7) ^f	1.69 (1.02)
Mobility Index (1–4) ^g	3.59 (.64)
Sociodemographic indicators	
Age, in years (50–62)	55.52 (3.20)
Gender (% male)	56.28
Education, in years (0–17)	12.02 (3.21)
Race (% White)	72.80
Race (% Black)	17.70
Race (% Hispanic)	8.71

Notes:^a Number of words correct^b Family & children outside of HH^c Higher scores reflect more engagement^d Knows the names of neighbors

Table 2. Estimates (regression coefficients)[†] of the effect of social relationships on cognitive performance 1992

Characteristic	IWR 1992 0-20		IWR 1994 0-20		IWR 1996 0-10		IWR 1998 0-10		IWR 2000 0-10	
	Mean or Percent		Mean or Percent		Mean or Percent		Mean or Percent		Mean or Percent	
Cognitive function										
Immediate WR (0-20) ^a		.397		.180		.178		.175		
Domain: Social ties										
Presence of spouse or partner	.184		.197		.056		.038		.038	
No of family members in household	-.044		-.021		.035		.007		.001	
Family members outside household ^b	.019		-.022		.006		-.005		.001	
Domain: Social contacts										
Level of contact with parents ^c	.016		.005		.005		.001		.002	
Level of contact with kids	.018		.010		.018		.002		.004	
Knows neighbors' names ^d	.184		.088		.050		.004		.004	
Domain: Social engagement										
Volunteering ^e	.184		.290		.084		.097		.056	
Working, not supervising others	.184		.177				.111		.131	
Domain: Complex social environment										
Supervise others at work	.374		.380		.143		.234		.318	
Health status 92										
Chronic conditions (0-7) ^f	-.059		-.097		-.065		-.097		-.078	
Mobility Index (1-4) ^g	.188		.269		.140		.062		.094	
Sociodemographic indicators										
Age, in years (50-62)	-.054		-.016		-.009				-.021	
Gender (% male)	.772		.881		.413		.492		.503	
Education, in years (0-17)	.234		.170		.126		.121		.119	
Race (% White)	-1.176		-.554		-.197		-.253		-.327	
Race (% Black)	-.536		-.267		-.113		-.178		-.100	
Race (% Hispanic)	.201		.274		.256		.249		.243	

Notes:

- a Number of words correct
- b Family & children outside of HH
- c Higher scores reflect more engagement
- d Knows the names of neighbors

e Yes = If ≥ 100 hours past 12

mos

f Hypertension, depression, stroke, diabetes, cancer, heart disease, lung

g Difficulty with 5 measures of mobility 1 = very difficult; 4 = not at all